DATA PROCESSING DIGEST

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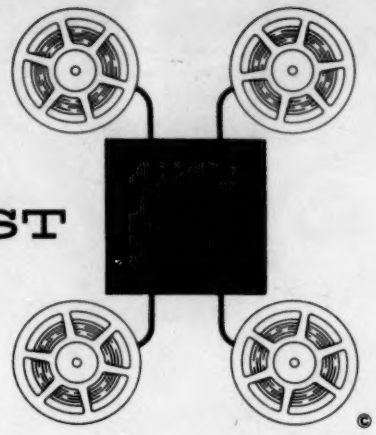

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General Information

SELECTING ELECTRONIC DATA PROCESSING EQUIPMENT

Myron B. Solo, County of Los Angeles, California
DATAMATION, November-December 1958; pages 28-32.

The procedure used for selecting electronic data processing for the County of Los Angeles is described in case study style. After preliminary study in which it was determined that there were areas in the County data processing activities which could utilize a computer to advantage, and after the establishment of an EDP division, a program was set up to select the equipment. This consisted of four steps: 1) A small but typical application, or "benchmark" problem was selected. 2) The benchmark problem and a set of specific questions were submitted to interested manufacturers. 3) The manufacturers' data were inserted into a formula to obtain, for each system, the cost of processing the benchmark problem. 4) The costs of each system were extrapolated to include the ten-year span of anticipated conversion to all the planned application.

The benchmark problem chosen was the file maintenance of the County Assessor's basic file of assessed properties. Formulas used to determine costs included annual operating costs, and the cost of doing a representative workload. Details of the benchmark problem as submitted by four manufacturers are given, along with the formulas and the results of the computations.

Reference 7, at the end of the article, states that the report "Evaluation of Bids for an Electronic Data Processing System," County of Los Angeles, Board of Supervisors, 1957, may be ordered from the Los Angeles Business Electronics Round Table, 2700 South Grand Avenue, Los Angeles 7, California. Price: $5.00. ((The publication in which the above article appeared inadvertently omitted the co-author's name. He is Roger L. Sisson, Canning, Sisson and Associates, Los Angeles.))

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AUTOMATION AND THE OFFICE—II

H. W. Gearing, The Metal Box Company Ltd.
THE COMPUTER BULLETIN, December 1958; pages 59-63.

In the first part of this article ((see DPD: December 1958, page 4)) the author poses several problems which have held back Great Britain in the use of computers for business. Here he expands his problems and suggests some possible solutions. He believes that an increase in the exchange of information through computer societies will cause more computers to be made for business use, and will aid users in finding answers to their problems. He believes that companies should program their applications before publicizing their installation, in order to avoid some of the disappointments seen in the U. S. Also, programs should be designed to allow for future alterations, since EDP systems cannot be changed as quickly as manual or mechanical routines. Better data must be collected before better information can be produced for management. Here the need is to "stratify our analysis of information into more detail before processing it, and take more sensitive observations more frequently...." One of the most perplexing problems in EDP is in finding the beginning and ending of the whole design process, for "you cannot know what you are going to need until you have written some of the program," and "you cannot begin to program seriously until you know which equipment you are likely to have." At some stage of the game, "you must make a decision on the grounds of reliability and availability of equipment, etc., and then invest your time on that system."

Which comes first?

((In a recent letter from Mr. Gearing regarding our abstract of his first article, he says that the computer situation has changed somewhat since he wrote these articles, and that the recent Computer Exhibition and Symposium in London is a truer reflection of the industry. His review of the Symposium, written in cooperation with Mr. D. W. Hooper, will appear in the Computer Bulletin, and will be reviewed subsequently in DPD.))

COMPUTER USE REPORT

Published by Systems and Procedures Association

A small 8-page pamphlet is filled with charts showing the results of a computer use survey made by the Systems and Procedures Association among its members. Three areas were covered in the questionnaire: 1) applications for computer use which were accepted by management, 2) applications which were rejected, and 3) specific information about the firms replying. There were 281 replies, of which 82 reported applications actually in service. Two hundred and three computers were involved in the study, representing 15% of the total number of medium and large scale computers in use.

Payroll is most popular application

Payroll was the most popular application, with sales analysis following. Cost accounting, billing, and stock inventory were next in use. More payroll and sales analysis applications were installed to reduce costs than for other reasons, but improved management control was a close second. The bulk of applications occur in companies with more than $21 million in gross annual income. As for savings, figures given for payroll applications only, indicate that the bulk of savings is under $5,000 or over $20,000 a year. Companies appear to need from 1,000 to 10,000 employees to effect manpower savings of any importance.

Applications rejected for EDP include, in this order, accounts payable, accounts receivable, billing, general ledger accounting, financial statement, and payroll, with scattered rejections among inventory, sales analysis, operations research, etc.

Among industries which are planning for or actually using EDP, the manufacturing groups are most numerous. Metal fabricating companies and electrical manufacturers are on top, with petroleum close behind. Among service or non-manufacturing industries, insurance is on top by a wide margin. At the bottom of the list are retail trade, transportation and communications, construction, and textiles.

Cost of the report is $1.50. It may be ordered from Systems and Procedures Association, 4463 Penobscot Building, Detroit 26, Michigan.

THE PERSONNEL SIDE OF EDPM

RAILWAY AGE, December 15, 1958, Page 13.

In September, Union Pacific Railroad signed an agreement with the clerks' brotherhood covering the EDPM center. The agreement establishes key positions at the center, with their classes, rates of pay and types of work, and seniority policies. The company must give advance 90-day notice of any change in work resulting from conversion to electronic methods, and 30 days before the effective date, the union must be given a description of the work to be transferred, positions to be eliminated or created, and other adjustments. The agreement states that transfers are to be based on seniority, fitness and ability, with training to be given senior applicants during working hours. Positions no longer required are to be vacated through normal attrition for up to four years from the date each such change takes place. Employees rolled back to lower jobs because of the electronic system are to receive their going rate of pay, and separation allowances are to be given displaced employees who choose to resign.

MANAGEMENTS STAKE IN INSTRUMENTATION

Pamphlet published by Instrument Society of America

Highlights of ISA Executive Day Program of the Instrument-Automation Conference (September 1958) are published in a 28-page pamphlet. Included are the talks by five executives which discuss the meaning of instrumentation as it applies to management. Of special interest are remarks by Dr. Robert J. Jeffries, president of Data-Control Systems, Inc., and A. F. Sperry, president of Panellit, Inc.

Control of business cycles is similar to process control

Dr. Jeffries speaks of the four fundamental concepts of instrumentation, and relates them to an over-all control of a business, showing the need for instrumentation in a continuous feedback control process. The four concepts are:

1. Measurement, which "embraces detection, discrimination, comparison, and display of resultant information."

2. Data handling and computation, which is "the processing of measurement data into useful information."

3. Automatic feedback control (example: thermostat heating system).

4. Systems engineering, which is "the design and synthesis of process and instrumentation to achieve optimum performance."

Mr. Sperry relates this idea more specifically to management decision-making for the control of a business. On this subject he says, "Economists are aware that typical business cycles are similar in many ways to the oscillation of disturbed chemical and petroleum processes.... which the control engineer has learned to control at the lower levels of production." He sees a disconcerting probability that "automation itself will, if anything, make these [oscillation] problems more unmanageable, and even more dynamic. Operations will tend to become more continuous, and plants will become smaller. As complexity increases, so will the sheer volume of information needed, yet faster through-puts and reduced inventories will make information timeliness more urgent than ever."

Measurement and accurate data gathering are aids to systems study

In order to supply management with the timely and reliable information it needs for sound decision-making, "we have to... mechanize the measurement and the gathering of the tremendous volume of data needed to operate our businesses.... Once these inputs are mechanized they can be merged with the data handling equipment and thus satisfy the basic requirements for feedback control.... The real

problem facing us is how to get the information about the systems and their dynamics, and how to formulate this information into mathematical models of the business systems themselves.... Managers, economists, accountants, marketing specialists and many others must join Operations Research and Instrumentation Engineers to produce the great mass of experimental data that can someday be correlated into a scientific approach."

Copies of the pamphlet may be purchased from Instrument Society of America, 313 Sixth Avenue, Pittsburgh 22, Pennsylvania.

TOOLS FOR MACHINE LITERATURE SEARCHING

J. W. Perry and Allen Kent
Published by Interscience Publishers, Inc., 1958. $27.50

The magnitude of the problem of mechanizing literature searching is indicated by the size of this volume--almost one thousand pages--and this is only Volume I of a series on the subject. This volume is a serious study of the problem, designed for the training and direction of personnel engaged in providing information services, and as a text for advanced students of library science.

Pilot studies at Western Reserve

The problem of literature searching is only one aspect of Machine Retrieval of Information, while Machine Retrieval is just one part of the broader subject of Machine Linguistics ((see DPD, August 1958, pg. 14)). Much of the early work in this important field of literature searching has been done at Western Reserve University in Cleveland, Ohio, where the authors are employed. "The principles, techniques, systems, and equipment presented in this book passed the 'test-tube' stage about five years ago. During the past three years, 'pilot-plant' operations have provided the background of experience which permits methods and processing techniques to be formulated, tentatively at least, as operating procedures. During the next several years, the techniques used will be refined as the pilot operations continue to mature."

After some introductory discussion of principles and costs, the procedures advocated by the authors are presented. (There are nine contributors to the volume, including the two named authors.) Briefly, the procedures are as follows: An abstract is prepared for a piece of literature in the normal fashion, covering the gist of the subject. Next, key words of this abstract are listed on a coding sheet. Then role indicators (arbitrary alphabetic symbols such as KOV and KAM) are placed in the left hand column to indicate the role of each key word. These role indicators tell whether the word refers to a property or a material, a component, a condition, and so on.

Role indicators and semantic codes

The next step is to provide an unambiguous code for the key words. English--or any natural language--is not clear, and a simple English word may embody many concepts (look up book in a thesaurus, for instance). So a semantic code is proposed which will clearly identify the concepts actually involved in the key words. The code proposed in the book has 214 semantic factors, from which 2,197 different four-letter code groups can be developed. For instance, "sound" is represented as SAND, while "audio" is represented as SYND. The system is open-ended and new codes can be added as required.

Numerous examples are given of the coding of abstracts. For example, the first line of one of the illustrative abstracts is, "Factors affecting the forming properties of several copper alloys in strip form." The coding sheet for this would look like:

Role Indicator	Key word	Semantic code of key word
KOV, KEJ	Strip	MAPR. 097
,KOV. KEJ. KUJ.	Alloy	LALL. 001
,KUJ	Copper	MATL. 1.

The coded abstract, as it might be stored on magnetic tape, would then look like: KOV. KEJ. MAPR. 097. , KOV. KEJ. KUJ. LALL. 001, KUJ. MATL. 1. . . . . .

Obviously, it would be desirable to have a machine perform as much of this coding as possible. In the method presented by the authors, the preparation of the coding sheets, with role indicators and key words, is done manually. They have mechanized the portion of the process which looks up the semantic code for the key words--and are performing this on a punched card system. The process is not unlike machine translation of Russian to English ((described in DPD, August 1958, pg. 14)).

The book discusses other important points such as the formulation of questions, automatic correlation, operational division of files (including search strategy and file subdivision), the Western Reserve University searching selector, and the use of electronic computers. The last two-fifths of the book is a semantic code dictionary and thesaurus of scientific and technical terms, edited by John L. Melton.

PROCEEDINGS OF NINTH ANNUAL NATIONAL CONFERENCE OF AIIE

JOURNAL OF INDUSTRIAL ENGINEERING, September-October, 1958.

The entire issue is given to the papers presented at the AIIE Conference in June, 1958. ((See DPD, January 1959, pg. 2, "EDP--Its Impact on Jobs, Procedures and People," one of the papers presented at the Conference.))

EDPM—GETTING PAST THE BARRIERS TO SUCCESS

D. Ronald Daniel, McKinsey & Co., New York
THE CONTROLLER, December 1958; pages 572-577, 592.

Six key barriers to successful electronic data processing are discussed, and some suggestions are given for hurdling or avoiding some of them. The barriers are:

1. "The failure to establish genuine top-management interest and support of electronic data processing as a concept instead of fascinating hardware."

2. "The inability to achieve an effective blend of existing company personnel with 'outside' talent."

3. "The absence of a realistic and workable relationship with the manufacturer of the electronic data processing equipment selected."

4. "The failure to recognize and promptly act on the organizational implications of electronic data processing."

5. "The inability to effect the behavior changes required to realize many of the potential advantages of electronic data processing."

6. "The failure to anticipate the 'disillusionment' that frequently develops."

The comments on these barriers are as follows:

Data processing is more important than hardware

1. Management needs to focus its attention on the D and P of EDPM, rather than the E and M. More important than the fancy hardware are sufficient funds for preliminary study and installation, the right people and an effective organization, and an adult management view of the EDPM program.

2. The program should be staffed with a blend of trained electronic data processing specialists and experienced company personnel.

3. The manufacturer should not be depended upon to give infallible aid, since his recommendations will be in terms of his machines, and may even conflict with the company's management policies and responsibilities. Also, the field is too new for manufacturers representatives to be considered the ultimate authority.

4. The impact of the computer program on the personnel is a problem too often unrecognized or ignored. "The

Effect on personnel needs much consideration

longer a company puts off considering the impact... the more difficult it will be to make any appropriate changes."

5. Going into an EDP program requires the changing of long-formed habits. The company should "undertake a systematic program to help executives acquire the skills required to utilize the new data. Such a program will usually involve on-the-job coaching and will be most successful when it is implemented from the top down."

6. Disillusionment frequently develops during the first year of operation, especially if the first five barriers have not been avoided.

These are all management problems, requiring management thinking and action. Recognizing them is the major step toward solving or avoiding them. And since they are all related, solving one facilitates solving the others.

MANAGERS FOR THE NEW INFORMATION MACHINES

Dr. John W. Carr, III, University of Michigan, Ann Arbor, Michigan
JOURNAL OF MACHINE ACCOUNTING, December 1958; pages 12-14.

Requirements for managing an Information System are:
1) ability to organize logically a sequence of control of information so that the main purpose of the organization can be performed;
2) ability to work with and understand people, so that a system which may be theoretically sound actually works, and is not hindered by misunderstandings of human capabilities and behavior.

This kind of leadership requires training in the structure of information systems and problems included in the systems, as well as practice in working with machines. The manager must also be trained to use the many languages required in the new systems. These include the language of the flow diagram, of the symbolic program step, the actual machine code, the natural language (e.g., English), and the language of logic.

A manager should understand meaning of "automaticity"

The manager must be trained to understand the meaning of "automaticity... the ability of an information machine to perform its functions without the need for human intervention." This kind of training has not received as much attention as language training, causing much wasting of valuable machine time by operators who move or insert information at their own, not the system's pace. "Such communication must be eliminated, or else turned completely over to the control of the information system. The system must be entrusted with the responsibility for changing from task to task as priorities change, or for controlling their entire sequence for 24 or more hour periods, unless interrupted by external intervention."

The need, therefore, is "for good auditors, good accountants, good managers who have a background in the new mathematics and logic that is required to understand the new and automatic clerical workers of today."

CONTROLLERS' CONGRESS CONVENTION PROCEEDINGS, 1958

RETAIL CONTROL, September and October, 1958.

These two volumes of RETAIL CONTROL contain the proceedings of the Controllers' Congress convention of the National Retail Merchants Association. The September issue includes the transcript of five sessions titled "Is Electronics Practical for Retailers?" Session One (page 116) introduces the new Electronics Committee of the Retail Research Institute ((see DPD: January 1959, pg. 5, "Practical Uses of Today's Point-of-sale Recorders")) and its aims and purposes, which include: development of an educational program for retailers, outlining of specific applications for an integrated EDP system, studies of data requirements for management action and merchandising and operating needs, consultation with manufacturers in the design of equipment for retail needs, dissemination of information to retailers on applications in operation.

IDP in retail stores may be based on punched price tags

Part II describes IDP as it applies to retailers. It points out that information must be recorded at its point of entry in re-usable form, and suggests that the logical place to start is with the print-punched price tag in the marking room, which may produce, at that point, a record of receipt of goods and on-hand quantity. This idea is carried farther in Part IV, which discusses future applications. It is suggested that print-punch tags be used to order merchandise, with the tags being attached to the merchandise by the manufacturer, and used at the store for sales information, inventory control, information on returned merchandise, etc. The point-of-sale use of the print-punch price tag is mentioned in the first four parts. Part III gives suggestions on making a feasibility study and discusses the experience of Woodward & Lothrop in developing an IDP system. Part V consists of floor discussion.

Small stores can use OR

The October issue contains, beginning on page 129, a paper titled "Applying Operations Research in Retail Stores." It is suggested that OR can help retailers solve their inventory problems in the areas of "when to buy" and "how much." It is estimated that in a large department store 700,000 decisions of this type are made each year. For this amount of decision-making, OR even for a small store is logical. Formulas may be developed to aid decision-making in four areas: 1) the ordering of staple merchandise on the basis of expected sales, 2) ordering for the introduction of a new item, 3) the handling of highly seasonable items, 4) studying the effect of promotion on sales in relationship with inventory level.

Such use of OR frees the buyer's time for more creative aspects of his work, and makes it possible to attend to aspects of the inventory problem usually ignored for lack of time. In the floor discussion it was suggested that small stores may take advantage of OR by using outside experts to assist in defining and solving such problems.

AUTOMATION SPEEDS YOUR FREIGHT

RAILWAY AGE, December 22, 1958; pages 24-26.

Railroads are finding a need for standardization of operating procedures and control signals to make full use of EDP systems in the areas where data is interchanged from railroad to railroad. The Southern Pacific, Union Pacific, Milwaukee, and Chicago & North Western have developed compatible car reporting systems. The AAR Accounting Division is developing methods to simplify interroad clerical work and billing. A table is given which lists railroads reporting to the Communication Plant Operation Committee, Communications Section, AAR, about application of combined automatic machines and teleprinter equipment. Other divisions of the AAR have set up working groups to coordinate efforts to this end.

ELECTRONIC COMPUTER EXHIBITION
BUSINESS COMPUTER SYMPOSIUM

THE ACCOUNTANT, December 6, 1958; pages 705-713.

The first European Electronic Computer Exhibition and Business Computer Symposium was held in London early in December. Summaries of the opening address and some of the papers are given in this issue. The latter included payroll and production, file maintenance, public utility accounting, banking, and government applications. Many of the experiences related by the speakers were similar to those of U. S. organizations. It is interesting to note that banks in Great Britain are cooperating in the standardization of check design, very much along the lines of the A. B. A. in the U. S.

COMPUTER FEASIBILITY STUDY

D. Field, Shell-Mex & B.P. Ltd.
THE ACCOUNTANT, November 22, 1958; pages 627-634.

Some guiding principles are given for those embarking on a feasibility study. The author advocates going into great detail in the study, including charting of procedures, and planning the integration of the procedures.

AUTOMATION + PR = CUSTOMER COOPERATION

Don G. Weller, Meadow Brook National Bank of Nassau County, N. Y.
BANKING, December 1958; pages 74-76.

A friendly cartoon character, "Mr. Meadowbrook," was used to introduce automation to the bank's customers. The bank took advantage of publicity values inherent in automation to reassure its customers and to obtain their cooperation. A 12-page pamphlet on the checking account system was sent to every customer. It contained a clear and concise explanation of the system, along with pictures and copy about the bank's 35 new machines, and pictures of the new forms and account cards and the selection of personalized check styles available.

The bank has also prepared a copyrighted manual which describes its nine-digit account numbering system. A copy of the manual may be obtained from the bank. Write to: Mr. Adolph Breiner, Jr., Vice President, Meadow Brook National Bank of Nassau County, West Hempstead, New York.

DEAR JIM (NO. 069.816): WE'RE AUTOMATED!

Alice Akes, Decatur County State Bank of Leon, Iowa
BANKING, December 1958; pages 78-80.

A small country bank is adapting itself to automatic checking account maintenance. The bank has 2600 checking accounts totaling between $3 and $4 million. NCR Postronics are being used. To help acquaint customers with the new method, the bank sent individually typed letters to its customers. New account cards were obtained for each account to provide for the new numbering system. Customers received an additional letter which included the plastic identification card which is used by customers and tellers to imprint the account number on deposit slips. Addressograph plates were prepared for each account. A master file was prepared from these for the first floor main banking area. The bookkeeping department in the basement uses the signature cards as its numbered file. The bank has found that between 94.6% and 95.6% of checks drawn on the bank are properly numbered.

SYMBOLIC LOGIC AND AUTOMATIC COMPUTERS (PART I)

Edmund C. Berkeley, Editor
COMPUTERS AND AUTOMATION, November 1958; pages 18-20.

An interesting and easily understood (but elementary) explanation of symbolic logic is presented, based on portions of a forthcoming book titled "Symbolic Logic and Intelligent Machines." The way in which symbolic logic differs from mathematics is explained and demonstrated with a simple example of symbolic logic. Part II will be printed in the following issue.

AUTOMATIC DATA PROCESSING

This is the name of a new magazine about to be published in England. A preview issue was published in mid-November, 1958. First monthly appearance on a subscription basis will be March 1959. The magazine is published by Business Publications which publishes BUSINESS, one of the magazines reviewed regularly by Data Processing Digest. The first issue includes articles on how a computer works, on the changes in management which result from the new data processing systems, the Electronic Computer Exhibition at Olympia in early December, computer education, computing services, and an article on analogue applications. ((See References, page 24 for address.))

PILOT

A new indexing service (Permutation Indexed Literature Of Technology) is offered by Permutation Indexing, Inc., of Los Angeles. The service offers library subscribers cross-references to monthly literature on electronics, computers, automation, and avionics. The titles of the articles contained in the 88 journals and technical publications included in the indexing are listed alphabetically by each significant word in the title. Thus, for example, all articles having the word "computer" in their title would become listed as a group through the "permutation indexing" technique. For information, write to: PILOT, Permutation Indexing, Inc., P.O. Box 25075, Los Angeles 25, California.

BOOKS OF INTEREST TO OFFICE ADMINISTRATORS

OFFICE MANAGEMENT, December 1958; pages 41-58.

Fifty-one books of interest to the office administrator are listed and annotated. Of these, the first 12 are on the subject of electronic data processing, and the next 19 are on the subject of systems design. The selection of books, proceedings, case studies, and manuals on EDP is a somewhat mixed grouping, and includes works on plant automation, and the highly technical aspects of control as well as introductory material on business electronics.

Systems

ABSTRACT FORMULATION OF DATA PROCESSING PROBLEMS

John W. Young, Jr. and Henry K. Kent, The National Cash Register Co.
JOURNAL OF INDUSTRIAL ENGINEERING, November-December 1958; pages 471-479.

An information system in terms of symbolic logic

The ultimate aim of the designer of an EDP system would be to have the computer solve the problem of its own maximum use in the system. To do this, the systems analyst needs a new tool for stating problems in a form the computer can understand and process for greatest efficiency. This article suggests one such tool.

The authors propose to state a data processing problem in pseudomathematical terms and logical statements which may then be diagramed to show how information enters, flows through, and leaves the system. Although at first glance the problem appears to become more complicated by this method, as the authors say, the statement in this symbolic and graphic form can not be more complex than the problem itself.

A sample order and invoicing system is given to illustrate the use of the symbols and the logical statements. The problem is then diagramed to show the relationships between various documents, and the information sets (or fields) contained by the documents. It is not possible to describe the symbolic representations here, because of the detailed explanations necessary. It is recommended that interested persons see the original article.

A clearcut picture for the programer

The method is valuable in reviewing an existing problem to insure that all of the input entries are used to produce outputs. It also can present all of the alternative methods of deriving information, to facilitate making decisions on the best organization of input. It helps in determining the cost of producing outputs as a criterion for their inclusion. For programing, it provides a clear statement of the problem to the programer. Maximum sizes of files and volumes of information, as well as the type of computation required, are easily determined. The graphical representation may be used for planning organization of files and subroutines, and checking on redundant and superfluous information.

FILES IN A PRODUCTION CONTROL SYSTEM

Roger L. Sisson, Canning, Sisson and Associates
JOURNAL OF INDUSTRIAL ENGINEERING, November-December 1958; pages 491-497.

A production control data system can be based on just seven files: customers, equipment owned or rented, operations, materials, orders, employees, and accounts. Establishing the system in the beginning on the basis of these seven files is preferable to adding on files as the need appears during the design of the system. The body of the article explains why these seven files are sufficient, and how the system will work.

DATA TRANSMISSION REAPPRAISED

NAVY MANAGEMENT REVIEW, November 1958; page 15-17.

The systems planner is warned to evaluate the installing of electronic communication equipment in an EDP system.

> "Before installing an electrical communication system, it is necessary to determine as precisely as possible the dollar value of the savings in time realized through electrical communication as opposed to the quickest means of physical communication. Secondly, this value must be weighed against the increased cost of electrical communication over the fastest means of physical communication."

It may be that less expensive methods of transmitting data to the computing center may be used, such as Air Express or air mail.

A DUAL MASTER FILE SYSTEM FOR A TAPE PROCESSING COMPUTER

Sherman Blumenthal, The Chesapeake and Ohio Railway Co., Cleveland, Ohio.
JOURNAL OF A.C.M., October 1958; pages 319-327.

It is suggested that magnetic tape files be kept to a reasonable size by culling records with an inactivity status corresponding to limits set by management policy. The culled files would be punched on cards and kept as a separate file. When a transaction occurs on one of these culled records, the data processing system would provide for a search through the punched cards for the missing record and re-entry of the record into the active magnetic tape file.

Management Sciences

LINEAR PROGRAMMING

Robert O. Ferguson and Lauren F. Sargent
Published by McGraw-Hill Book Company, 1958. $10.00

Linear programing is a helpful technique or tool for providing management with information on which to base decisions and planning. In this book, the material has been arranged in four sections: Introduction, Methods, Application, and Technical Appendixes; each of which is self-contained so that the reader may select just those sections of particular interest to him. The book is devoid of higher mathematics and highly technical discussions, except for the mathematical discussion of the Simplex method in the appendix.

Example case problems

Section One consists of an explanation of linear programing in terms understandable to business people. It acquaints them with the purpose and methods of LP, and describes some of the types of problems linear programing has solved. Section Two, "Methods," is divided into six chapters, each of which is devoted to one type of linear programing method. These include: the transportation or distribution method, the Modi method, the Simplex method (two chapters), the Ratio-analysis method, and the Index method. In Section Three, "Application," the application of linear programing to specific problems is covered in six chapters. Case studies and example problems are used to illustrate the applications. For example, Chapter 10 considers an actual case in decision-making represented by the Walcab Company, manufacturers of kitchen cabinets. The company wanted information and a program to help make decisions concerning which plant should manufacture the various products to meet customer delivery promises with greatest profit margin to the company, considering freight as well as manufacturing costs. The problem is solved by the Modi method. Detailed information is given about the company, its products, and its manufacturing methods, to give the proper background for the solution description. In another case problem, the most profitable share of market is found through the Simplex method, a technique which is expanded in Appendix A. The Simplex and the Modi methods are compared in Appendix B.

Applications

USING A COMPUTER FOR A MONTHLY PAYROLL

O & M BULLETIN, October 1958; pages 204-212.

The British Admiralty has experimented in using a Ferranti Pegasus Computer without magnetic tapes, originally purchased for scientific purposes, for processing payrolls. The article describes the procedure and the handicaps encountered in programing for this application. Actual progress on the project did not begin until July 1957.

Machine and manual methods in parallel

"Input data for a trial batch of 15 accounts were prepared in October 1957, and the program was tested on the basic operations, so that by December 1957 the computer was successfully calculating the pay for this number. Unfortunately there were major alterations in the pay regulations with effect from 1st January, 1958...which necessitated substantial amendments to the program already written but not fully tested. It was February 1958 by the time this had been completed, and the input data had been prepared for the 300 accounts which were to be the subject of the experiment. By the end of March, pay had been calculated in retrospect for January and February, and

currently for March, for comparison with the manual calculation. There were differences between the two sets of results which were due to programing errors, incorrect preparation of original data and/or notifications of changes, or errors in the manual calculation which had not previously been detected at the time the comparison was made. Since March 1958 it has been possible each month to produce the results from the computer before the manual calculation has been finalized. The differences which now occur are few and are almost entirely due either to the omission of notification of changes, or to errors in the manual calculation which would no doubt have been rectified later during the normal checking procedure. Although the manual calculation remains the basis of payment the pay statements produced from the output of the computer are in fact being used for distribution each month to the staff concerned."

PRODUCTION DATA PROCESSING

John Wm. Parker
THE ACCOUNTANT, November 22, 1958; pages 621-623.

The method for processing information for plant loading, stock control and progress control, using a HEC (Hollerith Electronic Computer) is given. In preparing progress reports, operation job cards are produced in duplicate, one set being retained in the data processing center, the other cards sent to their respective production departments as authorities to proceed. As operations are completed the cards are marked with quantities made and returned to the center. These are collated with the original cards, and processed to produce lists of jobs planned for but not completed, and jobs completed but with discrepancies between required and actual. This makes it possible to make immediate provision either for working overtime, or for amending the production plans for future manufacture. The article is based upon an actual application of the HEC in the factories of the British Tabulating Machine Co. Ltd.

THE USE OF ELECTRONIC COMPUTERS FOR STATISTICAL WORK

O & M BULLETIN, October 1958; pages 220-226.

Government surveys and studies in Great Britain are being processed on electronic computers. These include a family expenditure survey, production and distribution censuses, trade and income tax studies, post office statistics, overseas trade statistics, and studies in labor, agriculture, and education. The general census will be considered for processing electronically in 1961.

SWIFT USES EDP TO SLASH COSTS, IMPROVE MANAGERIAL DECISIONS

AMERICAN BUSINESS, December 1958; pages 28-31.

Swift & Company, meat packers, has installed IBM 650 computers in data processing centers at St. Paul and Chicago. Applications will include a monthly "repair analysis" which shows repair costs classified by plant, section and machine. This will help the company allocate personnel, spare parts inventory, and preventive maintenance time among the plants, as well as determine machine replacement and compare competing machines. Other applications will be new plant location, calculation of optimum feed mix, and production scheduling. This last application is expected to save the company from 2% to 6% on freight bills which presently run into several million dollars.

METROPOLITAN TRAFFIC PLANNING IN VANCOUVER

E. K. Goodman, City of Vancouver
COMPUTING NEWS, December 15, 1958; pages 15-21.

The Technical Committee for Metropolitan Highway Planning of the City of Vancouver, has used the Alwac IIIE computer at the University of British Columbia to forecast the 1976 motor vehicle trip requirements. The mathematical method used was the one developed for the Detroit Transportation Study in 1954. It has been found that a computer aids in traffic research in areas formerly extremely difficult or impossible to explore.

Equipment

UNIVAC AUXILIARY TAPE PROCESSING EQUIPMENT

The Dykor Peripheral Tape Equipment is a single device which can perform off-line testing, interrogation, editing, copying and translating of Univac tape. It tests any reel of Univac tape to determine whether it can be read without error. It may be used to type out any specified item or block on a tape file. It may be used to locate, then correct or update an item in the tape file. The entire tape may be copied, and tapes of different pulse densities may be copied to make them compatible with other Univac equipment. Through the use of a plugboard translator, the equipment may be used to translate from Univac tape to other types of magnetic tape. For information, write to: Digitronics Corporation, Albertson Avenue, Albertson, New York.

BURROUGHS DEMONSTRATES NEW 3,000 WORD-PER-MINUTE "ELECTROSTATIC RECORDING" PROCESS

OFFICE MANAGEMENT, December 1958; pages 73, 85.

Burroughs has designed a printer for the U. S. Army Signal Corps which can receive messages by wire transmission. The printer uses a bank of recording heads to beam letters at the paper surface electronically. Each head consists of 35 tiny wires embedded in a plastic terminal, and forming a 5x7 matrix. The wires are charged selectively, forming the designed letter or number in each of the 72 heads across the line of type. Only the one to be printed is activated. Characters are printed serially across the page at the rate of 3,000 words per minute. The paper receives the electrostatic charge and the latent image is then processed to become visible.

Comment

BANK AUTOMATION (Continued)

Last month, we discussed some of the systems design problems facing the systems snalyst in an individual bank, when his bank decides to embark on an automation program. In that Comment, we concentrated on method problems--decisions on what the new integrated automatic and manual system must do. In the present discussion, we will consider some oi the major factors which will influence the economics of the situation, including problems of magnetically imprinting the checks and operating the system. As we said last month, our objective is to give a clearer understanding of the role of the systems analyst, and we are using a bank automation project as an illustration.

Production of Checks

Cost and quality are problems in magnetic ink printing

It seems apparent on the surface that the printing of checks for an automated system will be more expensive than the printing of present-day conventional checks, if for no other reason than two types of inks may be used, regular and magnetic. The systems analyst is faced with determining how much these costs will increase, as this extra cost may well be charged against the electronic system.

Studies by the American Bankers Association have been aimed at reducing the tolerance requirements for the magnetic characters. Early tests have indicated that the magnetic characters must be printed with very high quality; even checks printed by the

highest quality bank note printers have failed in service. If high quality printing is required, a problem is then raised for those banks which now print their own checks.

In addition, the printers must obtain a new type font, for the special form of arabic characters used in the magnetic numerals. The magnetic inks and ribbons probably will be more costly. It is estimated that 14 billion checks will be used annually by 1960. [1]

Account numbers must be verified

It appears that there will be a need to verify the checks after printing. [2] The checks probably must go through the presses twice, once for regular ink and once for magnetic ink. Since the bank identification number and customer account number may be printed in both types of ink, some form of checking will be needed to assure that they agree (this is one reason why the magnetic characters are printed in an arabic form). Finagle's First Law is: If something can go wrong with an operation, it will--which indicates that the account numbers should be checked. In addition, the uniformity of magnetic ink is important, so that it may be necessary to verify the magnetic qualities of the characters on <u>every check</u>, just after the printing has been done.

And then, too, all existing checks must be redesigned, to allow the 1/2 inch spacing at the bottom, discussed last month. It has been estimated that it costs $40 on the average to redesign a check form. The question is raised: who pays this $40? The problem may be solved by banks giving special rates to customers using magnetically imprinted checks. The systems analyst must see to it that this question is answered fully for his own bank. And then he has the problem of fitting the redesign of all checks into the overall conversion schedule.

Determination of the dollar magnitude of each of these production factors poses a real challenge to a systems analyst, especially in these early days of bank automation.

Operation

There are numerous factors which can cut down the effective speed of the mechanized system, and thus increase the costs. It is here that intelligent engineering by the machine designers can play a large role.

Exceptions mean lost time and higher costs

For one thing, all "on us" checks coming in from other banks probably must first be balanced against control totals, before any sorting is done. This may mean an initial run through the electronic sorter to develop batch totals, before the first sort run can commence.

Then the problem of handling exceptions and rejects comes up. For instance, "stop payments" and overdrafts are detected when a check is posted to the customer's account. When detected, someone must go over to the "paper handling system," locate and pull out the check in question. Similarly, the "paper handling system" will

reject some checks where the magnetic characters cannot be read correctly. Such disturbances as these mean that the bank must have people on hand to take care of the situation. Perhaps even worse, if such disturbances stop the mechanized system, the fact that people are much slower moving than the mechanized system may mean a serious reduction in overall operating speed of the mechanized system. It has been estimated that an error rate of only 2% might well cut the speed of the mechanized system to a point where it is no longer economically feasible.

In addition to exceptions and rejects, the systems analyst must be aware of the normal "loss factors" with which any system is faced. These loss factors including emergency down time, time needed to rerun jobs because of an error, idle time due to scheduling difficulties, and so on.

A forecast of peak activity is needed

Then there is the problem of peak days of the week and peak weeks of the year to consider. Operating statistics are needed to determine the magnitude of these peaks. And the mechanized system selected must have the capacity for handling the peaks. Similarly, the growth in the number of checks handled and customer accounts handled must be determined for the next X years (at least for the write-off period for the project); the equipment must either have the capacity to handle this growth, or must be expandable to handle it, within economic limits.

Only when such factors as these are determined can the systems analyst know the effective speed of the mechanized system, and therefore the true cost of the mechanized system.

Selection of Equipment

The systems analyst is now confronted with a wide variety of equipment to perform the same job. Even within fully mechanized systems, the selection is high.[3, 4]

Obviously, the analyst must keep in mind the problems of operation discussed above when selecting equipment; as mentioned, intelligent engineering can considerably reduce lost time due to exceptions and rejects.

Is a RAM the answer?

A basic problem can center around the use of a random access memory for master file storage.[3] Some question might be raised on the value of a RAM in this application, since so much sorting has to be done anyhow.

Many of the questions can be settled on the basis of economics. An article reviewed in this issue[5] shows how the value of the claims of different manufacturers can be reduced to dollar figures.

Conclusion

In these two articles, we have tried to point out some of the major problems facing a systems analyst when he is involved in a bank automation project. A similar discussion could be made for any other type of application. As we stated last month, there is a lot more to this systems analysis work than just programing.

References:

1. "Automation in Check Handling," DPD, April, 1958, p. 1.
2. "Dual Code Perforation," DPD, January, 1959, p. 13.
3. "IBM Check-Processing System," DPD, February, 1958, p. 12.
4. "First Sorter for Bank Automation System Shipped," DPD, October, 1958, p. 6.
5. "Selecting Electronic Data Processing Equipment," DPD February, 1959, p.1

Meetings

Eleventh Annual Industrial Engineering Institute, sponsored by University of California

Date: February 6, 7, 1959
Place: Simultaneous sessions at Berkeley campus and Los Angeles campus
Fee: $30, including two luncheons and copy of printed Proceedings of the Institute
Information: Department of Conferences, University Extension, University of California, Berkeley 4, California; or Engineering Extension, University of California, Los Angeles 24, California

American Management Association 5th Annual Electronics Conference and Exhibit

Date: March 2-4, 1959
Place: New York City (Statler-Hilton Hotel)
Information: Roderick W. Smith, Assistant Manager, Finance Division, AMA, 1515 Broadway, New York 36, New York

Western Joint Computer Conference

Date: March 3-5, 1959
Place: San Francisco, California (Fairmont Hotel)
Theme: "New Horizons with Computer Technology"
Information: Mr. G. A. Barnard, Ampex Corp., 934 Charter St., Redwood City, California

Life Office Management Association Automation Forum

Date: April 13-15, 1959
Place: Chicago, Ill.
Information: Life Office Management Association,
110 E. 42nd St., New York 17, New York

ORSA National Meeting

Date: May 14, 15, 1959
Place: Washington, D. C. (Shoreham Hotel)
Information: Operations Research Society of America,
Mt. Royal & Guilford Ave., Baltimore 2, Md.

"Expanding Horizons of Industrial Engineering," National Conference, American Institute of Industrial Engineers

Date: May 14-16, 1959
Place: Atlanta, Georgia (Biltmore Hotel)
Fee: Members, $39.50; non-members, $49.50. (Single event fees also available)
Information: AIIE, 145 North High St., Columbus 15, Ohio

NOMA Conference and Exposition

Date: May 24-27, 1959
Place: New Orleans, Louisiana (Roosevelt Hotel)
Information: W. H. Latham, NOMA, Willow Grove, Pennsylvania

International Conference on Information Processing

Date: June 15-20, 1959
Place: Paris, France
Information: U. S. Committee for the First International Conference on Information Processing, Box 4999, Washington 8, D. C.

International Accounting Conference

Date: June 21-24, 1959
Place: New York (Waldorf-Astoria)
Information: Robert F. Nolan, National Association of Accountants,
505 Park Ave., New York 22, N. Y.

British Computer Society First Annual Conference

Date: June 22-25, 1959
Place: Cambridge, England
Information: British Computer Society, Finsbury Court,
Finsbury Pavement, London EC 2, England

NMAA National Conference

Date: June 24-26, 1959
Place: St. Louis, Missouri (Chase-Park Plaza Hotels)
Information: National Machine Accountants Association,
208 South Main Street, Paris, Illinois

1959 ACM National Conference

Date: Summer, 1959
Place: M. I. T.
Information: F. Verzuh, Massachusetts Institute of Technology, Cambridge, Mass.

TIMS International Meeting

Date: September, 1959
Place: Paris, France
Information: The Institute of Management Science, Attn: Harold Cauvet, 250 North Street, White Plains, New York

ISA Conference

Date: September 21-25, 1959
Place: Chicago, Illinois
Information: Instrument Society of America, 313 Sixth Avenue Pittsburgh 22, Pennsylvania

International Automation Exposition-Congress

Date: November 16-20, 1959
Place: New York (Trade Show Bldg.)
Information: Richard Rimbach, 845 Ridge Ave., Pittsburgh 12, Pa.

Training

"Electronic Data Processing for Business and Industry" (Course 10), presented by Richard G. Canning

Date: March 9-13, 1959
Place: New York (Hotel Roosevelt)
Fee: $250
Program: Emphasis on the applications aspect of electronic data processing. Four guest lecturers on specific applications.
For whom: Management personnel charged with setting up an EDP system
Information: Richard G. Canning, 1140 South Robertson Blvd., Los Angeles 35, California

"Installing an Electronic Data Processing System" (Course 20), presented by Richard G. Canning

Date: April 20-24, 1959
Place: New York (Hotel Biltmore)
Fee: $250
Program: Organization, personnel, physical installation, conversion, operation of the EDP system are the subjects covered. It is desirable, but not required, that attendees have taken Course 10 or its equivalent.
Information: Richard G. Canning, 1140 South Robertson Blvd., Los Angeles 35, California

References

The publishers of books and periodicals mentioned in this issue of DATA PROCESSING DIGEST are listed below for your convenience in writing for more complete information.

The Accountant
4 Drapers' Gardens
Throgmorton Avenue
London EC 2, England

American Business
4660 Ravenswood Ave.
Chicago 40, Illinois

Automatic Data Processing
Mercury House
109-119 Waterloo Road
London SE 1, England

The Computer Bulletin
The British Computer Society Ltd.
Finsbury Court, Finsbury Pavement
London EC 2, England

Computing News
12805 - 64th Ave. South
Seattle 88, Washington

The Controller
Two Park Avenue
New York 16, New York

DataMation
10373 West Pico Blvd.
Los Angeles 64, California

Instrument Society of America
313 Sixth Avenue
Pittsburgh 22, Pennsylvania

Interscience Publishers, Inc.
250 Fifth Avenue
New York 1, New York

Journal of A. C. M.
Mt. Royal and Guilford Ave.
Baltimore 2, Maryland

Journal of Industrial Engineering
145 North High Street
Columbus 15, Ohio

Journal of Machine Accounting
208 South Main Street
Paris, Illinois

McGraw-Hill Book Co.
330 West 42nd Street
New York 36, New York

Navy Management Review
Supt. of Documents
U. S. Government Printing Office
Washington 25, D. C.

O. & M. Bulletin
Treasury Chambers
Great George Street
London SW 1, England

Office Management
212 Fifth Avenue
New York 10, New York

Railway Age
30 Church Street
New York 7, New York

Retail Control
Controllers Congress of National
Retail Merchants Association
100 West 31st Street
New York 1, New York

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